Example of grading a model using the HALOE CH4 Antarctic data set

Referring to the HALOE/CTM figure in this file, here are the grades I would assign based on the 6 tests described in ccmval_diagnostic_strahan.doc.

1. The 450K distributions overlap, are somewhat broad, and have a clear separation (1 pt). The 600K distributions are very sharp and are weakly overlapping (0 pt). The 600K separation is greater than the 450K one (1 pt). Total 2 out of 3.

2. At both 450K and 600K, the V_{mpv} is just slightly higher in October than it was in September, ½ point each. On both surfaces, the minimum of the overlap of the two pdfs is lower in October than in September, 1 point each. Total 3 out of 4.

3. At both 450K and 600K, the most probable value in the midlatitudes in October and November is not lower than it was in September (1 pt each). Total 2 out of 2.

4. The width of V_{pdf} at 450K decreases between September and October (1 pt), but it doesn't really at 600K because 600K was already too sharp in September (0 pt). Total 1 out of 2.

5. In November, the 450K V_{pdf} has a long tail but is not bimodal (½ point). The 600K V_{pdf} is bimodal and the 800K V_{pdf} is single mode *and* looks like the M_{pdf} (1 pt each). There is a progression in the V_{pdf}s showing increasing amounts of midlatitude air with increasing height (1 pt). Total 3.5 out of 4.

6. In November at 600K, the high CH_4 peak of the V_{pdf} fits under the M_{pdf} peak (1 pt). The 450K V_{pdf} hasn't yet developed a high CH_4 peak as it should (0 pt). Total 1 out of 2.

Summary : The total score 12.5/17, or 74%. These 'tests' indicate the strengths and shortcomings of the model vortex. This model is able to develop a well isolated vortex in the lower stratosphere which increases in isolation in October. However, it strengthens too early and, at 450K, lasts too long; it should be considerably eroded by November but it is not. Mixing ratios inside the vortex do not decrease in October, suggesting that some midlatitude air may be able to leak in. The vortex behavior as a function of height (stronger earlier at 600K and also eroding earlier at higher levels) is correct. Midlatitude air does not show any evidence of 'pollution' from large amounts of vortex air mixing in mid-spring. Once air is eroded from the vortex, it rapidly loses its identity and becomes 'midlatitude air'.

Vortex pdf (60-80S) is blue. Midlatitude pdf (44-60S) is red.